

# Integrated Photonic Engine for Miniaturized Fiber Optics Sensor Interrogators, Phase I

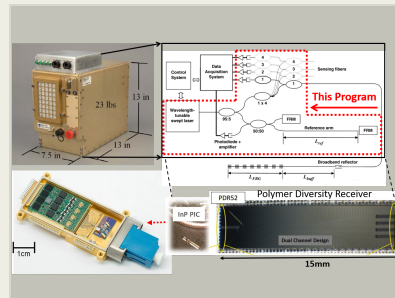
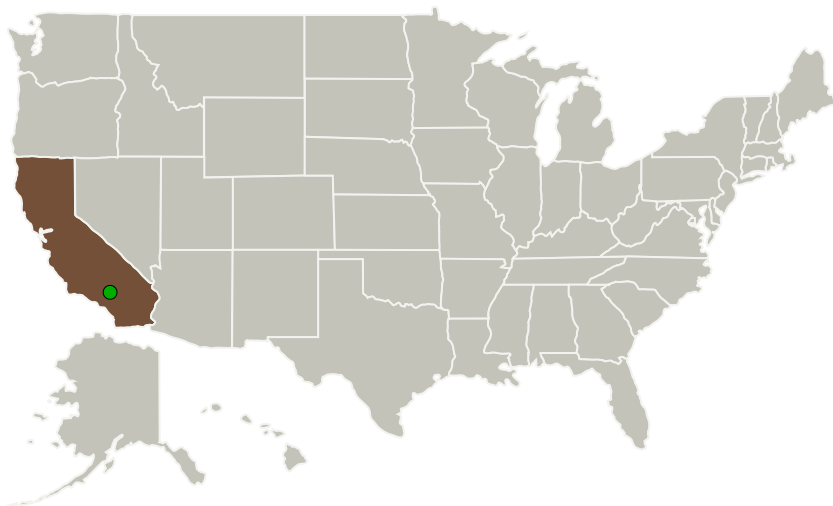
Completed Technology Project (2017 - 2017)



## Project Introduction

Structural health monitoring is critical capability for NASA, and it is required for launch vehicles, space vehicles, re-entry vehicles, vehicle pressure systems, Space Station, as well as in flight research. Health monitoring systems need to have fast and robust data acquisition and management, low volume, minimal intrusion, and high accuracy and reliability. Armstrong Flight Research Center has developed a revolutionary 4-fiber interrogation system for Fiber Optic Smart Structures (FOSS) sensor networks interrogation. This system meets the required specifications on the sensing side, however, its size, weight, power consumption, fragility and cost make it prohibitive for the massive deployment into air vehicles. In this program, we are proposing to develop and integrate all optical functions needed to enable next generation of miniaturized, low-cost NASA's FOSS interrogator systems. Through innovative photonic integration of key functions, and hybrid packaging using interposer technology, we anticipate that the size of the existing system will be reduced by two and cost by one order of magnitude. This, in turn, will fulfill one of the key requirements of the solicitation, yielding a miniaturized fiber optic measurement system with low power suitable for migration into platforms spanning from launch vehicles, reentry vehicles, to UAS platforms or aviation.

## Primary U.S. Work Locations and Key Partners



Integrated Photonic Engine for Miniaturized Fiber Optics Sensor Interrogators, Phase I Briefing Chart Image

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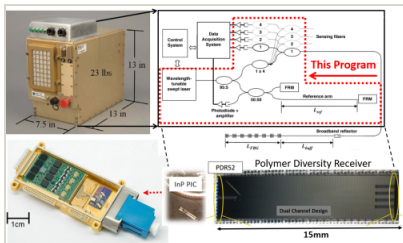


Organizations Performing Work	Role	Type	Location
Freedom Photonics, LLC	Lead Organization	Industry	Santa Barbara, California
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

## Primary U.S. Work Locations

California

## Images



### Briefing Chart Image

Integrated Photonic Engine for Miniaturized Fiber Optics Sensor Interrogators, Phase I Briefing Chart Image  
(<https://techport.nasa.gov/image/136539>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Freedom Photonics, LLC

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

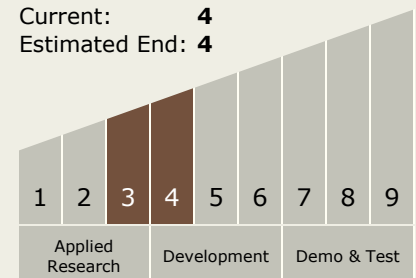
Carlos Torrez

### Principal Investigator:

Milan Mashanovitch

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.4 Environment Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System